EARTH SATELLITE CORPORATION
(EarthSat)

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September 10, 1973

E73-10979
CR-133758

Mr. Ryborn Kirby
Mail Code TF-6
NASA Johnson Spacecraft Center
Houston, Texas 77058

Re: NAS9-13286, EREP #510
EarthSat Project: G-089

Dear Mr. Kirby:

Our seventh monthly progress report is enclosed as per requirements of the above referenced contract.

Sincerely,

Charles E. Poulton
Principal Investigator

CEP:dlv
Enclosure

cc: V. M. Dauphin, Code TF
NASA/STIF, Code KS

MONTHLY PLANS AND PROGRESS REPORT

Title:	Plan for the Uniform Mapping of Earth Resources and Environmental Complexes from Skylab Imagery
Progress Report:	No. 7
Period Covered:	1 August 1973 to 31 August 1973
Contract:	NAS9-13286 EREP Investigation #510
EarthSat Project:	G-089
Principal Investigator:	Charles E. Poulton Earth Satellite Corporation 2150 Shattuck Avenue Berkeley, California 94704
NASA Technical Monitor:	Ryborn Kirby TF6 EREP Principal Investigation Management Office Houston, Texas 77058

MAJOR ACCOMPLISHMENTS

Rice Analog Areas

Louisiana: One ground data and aerial photo collection trip was completed to the Louisiana Coastal Plain test areas in August. This field trip was planned to correspond with the middle of the maturation/harvest period in the rice-growing areas. However, due to weather-delayed initial planting, the harvest will carry on well into September. For this reason, additional large-scale and field data collection has been scheduled for late September. A revised list of acquired large-scale photography can be found in Appendix I. Appendix II lists proposed dates for additional large-scale photography and ground data acquisition for the various test sites.

Continued warm, moist weather throughout August has been beneficial to rice production. The rice crop is in one of four heading conditions; flowering, green head, maturation or dry head. Physiognomy of the rice crop is now in a highly photogenic state for production estimation. The various strains and variable planting dates are expressing well and provide a range of appearances.

The more severe yield limiting problems are beginning to be evident. In cooperators' fields examples of severe lodging, rotten neck (a blast disease), empty head (also blast), dead spots (stem rot) and other limiting agents can be found. These disease problems are being monitored periodically on the large-scale aerial photography as well as by ground observation.

To date, no EREP coverage has been received of the Louisiana test sites, nor has any supporting high-flight photography been received at the EarthSat office. However, photo interpretation is beginning on the large-scale photography in preparation for receipt of EREP materials.

Northern Great Valley, California: No Skylab coverage was scheduled for July but one data collection trip was scheduled in order to maintain the continuity of coverage as the crop develops. This continuity of observation is necessary because of the transient nature of some of the early season yield limiting factors. Factors such as these may have severe effects on yield but may not be visible on photography as the crop growth progresses toward harvest. An excellent example of such a problem is the establishment of a poor initial rice crop stand. Early in the season it may be obvious that a substantial portion of the potential crop area does not support a rice stand whereas later in the

season, vegetative growth of adjacent vegetation or later developing weeds may fill in these areas, producing the erroneous appearance of 100% ground cover. As well as these transient factors, it is necessary to monitor the conditions leading up to late developing yield limiting factors. Finally, it is extremely important to monitor the development of normal or high yield fields in order to provide adequate control examples.

In Louisiana rice fields, differentiation from other crops is not difficult due to the limited number of alternative crops and their respective developmental characteristics. However, in the California climate, a wide variety of potentially confusing analogs may be present at various times of the year. Continuity of coverage is essential to full utilization of the "crop calendar" concepts for accurate differentiation.

Later planting dates in the California rice areas have produced a different time sequence than that found in Louisiana. During July in California the rice crop mainly reached vegetative stages in growth with only small percentages of the crop beginning to head out. No significant disease problems were observed during the ground data collection or on the large-scale aerial photography.

The month of August will be utilized for correlating cooperators' field data and large-scale photography for the Louisiana test site and preliminary interpretation of imagery. The main tasks for the California test site will be the continued enlistment of farmer cooperation and collection of ground and aerial data.

Natural Vegetation Analog Areas

One ground truth and large-scale photographic mission was conducted four days after Skylab III obtained pictures of southwestern Colorado. Over 100 analog sites were documented and subsampling of high-flight imagery was obtained at the same time with both color and color infrared film.

Flightlines for RB-57 coverage of the Skylab III flightrack were selected and flown by NASA on the day of the overpass. Imagery obtained from these two photographic missions will be valuable in phenological studies to be conducted later. Early August is not the optimum time for viewing many analog types but it is a critical transitional time between the spring and summer growing seasons and fully mature stages of vegetation in September. Desert vegetation is for the most part dormant during this period. Since Skylab III obtained imagery of both the Colorado Plateau test area and the Sierra-Lahontan test area in August, the inter-regional aspect of our study will be assured upon receipt of imagery from Skylab III and RB-57 underflight coverage.

Skylab II imagery was received. S190A imagery of the Sierra-Lahontan test site had a high percentage of cloud cover and as a result, cannot be used in an analysis of natural vegetation. S190B imagery of the Colorado Plateau test site was received. Image quality appears excellent with no cloud cover. Enlarged color prints of this imagery are being made for analog identification and image quantification.

S192 screening film was received for both natural vegetation test sites. Due to cloud cover in the Sierra-Lahontan area, no multispectral data will

be analyzed for the area from Skylab II. S192 screening film covering the Colorado Plateau is usable. Prints are being made of selected areas at the same scale as the S190B Colorado Plateau imagery for direct comparisons of the two systems. The screening film will be used to select the necessary tapes for analysis of the S192 system. The necessary software for analyzing the S192 tapes has been developed by EarthSat personnel.

TRAVEL PLANS

Both rice test areas will be visited. The Sierra-Lahontan test area will be visited to obtain phenological data and locate additional analog sites.

PERSONNEL

No changes have occurred since the last reporting period.

PROBLEMS

Due to cloud cover in the Sierra-Lahontan region during the Skylab II photographic mission, no data will be available for the spring season. This date is critical for optimum differentiation of salt desert and semi-desert grassland vegetation since these vegetation types become dormant by July.

PLANS FOR NEXT REPORTING PERIOD

Ground study and large-scale color and color infrared imagery will be obtained for all test sites during the critical fall time period for both rice crops and natural vegetation. S190A and S190B imagery will be analyzed to locate test sites. The imagery will be tested to determine its capabilities for detecting vegetation types and complexes and monitoring field crops.

APPENDIX I

Large-Scale Imagery Obtained to Date for All Test Areas

DATE OF COVERAGE	AREA OF COVERAGE	FILM TYPES AND SIZES OBTAINED
3/31/73	Louisiana Coastal Plain	35mm, 70mm color and color IR
5/7/73	No. Great Valley	35mm and 70mm color and color IR
6/3/73	Louisiana Coastal Plain	35mm, 70mm, 9"x9" color and color IR
6/5/73	Colorado Plateau	35mm, 70mm and 9"x9" color and color IR
6/14/73	No. Great Valley	35mm, 70mm and 9"x9" color and color IR
6/15/73	Tahoe-Lahontan	35mm, 70mm and 9"x9" color and color IR
6/29/73	Louisiana Coastal Plain	35mm, 70mm and 9"x9" color and color IR
7/10/73	No. Great Valley	35mm, 70mm and 9"x9" color and color IR
7/11/73	Tahoe-Lahontan	35mm, 70mm and 9"x9" color and color IR
7/12/73	Colorado Plateau	35mm, 70mm and 9"x9" color and color IR
7/28/73	Louisiana Coastal Plain	35mm, 70mm and 9"x9" color and color IR
8/8/73	Tahoe-Lahontan	35mm, 70mm and 9"x9" color and color IR
8/9/73	Colorado Plateau	35mm, 70mm and 9"x9" color and color IR
8/10/73	Louisiana Coastal Plain	35mm, 70mm and 9"x9" color and color IR
8/28/73	No. Great Valley	35mm, 70mm and 9"x9" color and color IR

APPENDIX II

Tentative Schedule for Additional Large-Scale Imagery
for All Test Sites

DATE OF COVERAGE	AREA OF COVERAGE	FILM TYPES AND SIZES OBTAINED
8/12/73	No. Great Valley	35mm, 70mm and 9"x9" color and color IR
8/13/73	Tahoe-Lahontan	35mm, 70mm and 9"x9" color and color IR
8/16/73	Louisiana Coastal Plain	35mm, 70mm and 9"x9" color and color IR
8/20/73	Colorado Plateau	35mm, 70mm and 9"x9" color and color IR